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## Pesticide Safety 2012 - Pesticide Safety Review

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# ***Pesticide Safety Training 2012***

## **Pesticide Safety Review**

**Martha Sylvia  
Entomology Lab  
Cranberry Station  
UMass Amherst**



1. How to Keep Safe
2. Know your products
3. PPE Review
4. Acute Toxicity vs.  
Chronic Toxicity
5. Heat Stress
6. Licensing and Certification
  - MDAR and WPS
7. Label Review
8. Resistance Management
9. Update on New Insecticides
10. Winter Moth

**Pesticide Safety and PPE**

**Label Review and Resistance Mgmt**



# How to Keep Safe

- Reduce Your Risk

- Safety Practices

- Know Your Products

- Personal Protective Equipment

# Reduce Your Risk

- Read the label
- Wear at least the PPE that is recommended
  - Protect what the label tells you to protect (eyes, lungs...)
- Use common sense
- Don't be lazy!

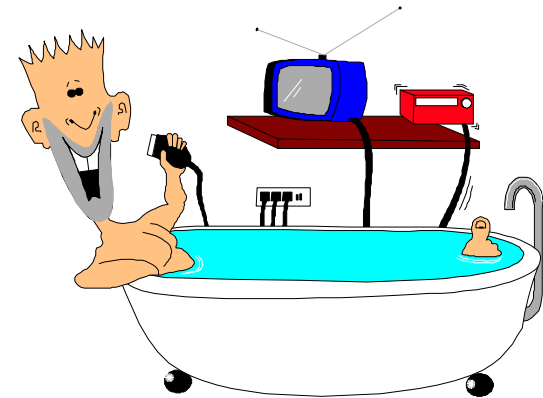


# HAZARD = EXPOSURE x TOXICITY



**Exposure** - how pesticides enter the body

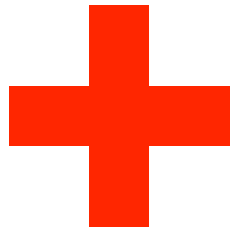
**Toxicity** - how poisonous the pesticide is



# 4 Methods of Exposure

- Dermal (skin)
- Oral (mouth)
- Inhalation (lungs)
- Eyes





# Dermal exposure

The most common way for pesticides to enter the body is through the skin

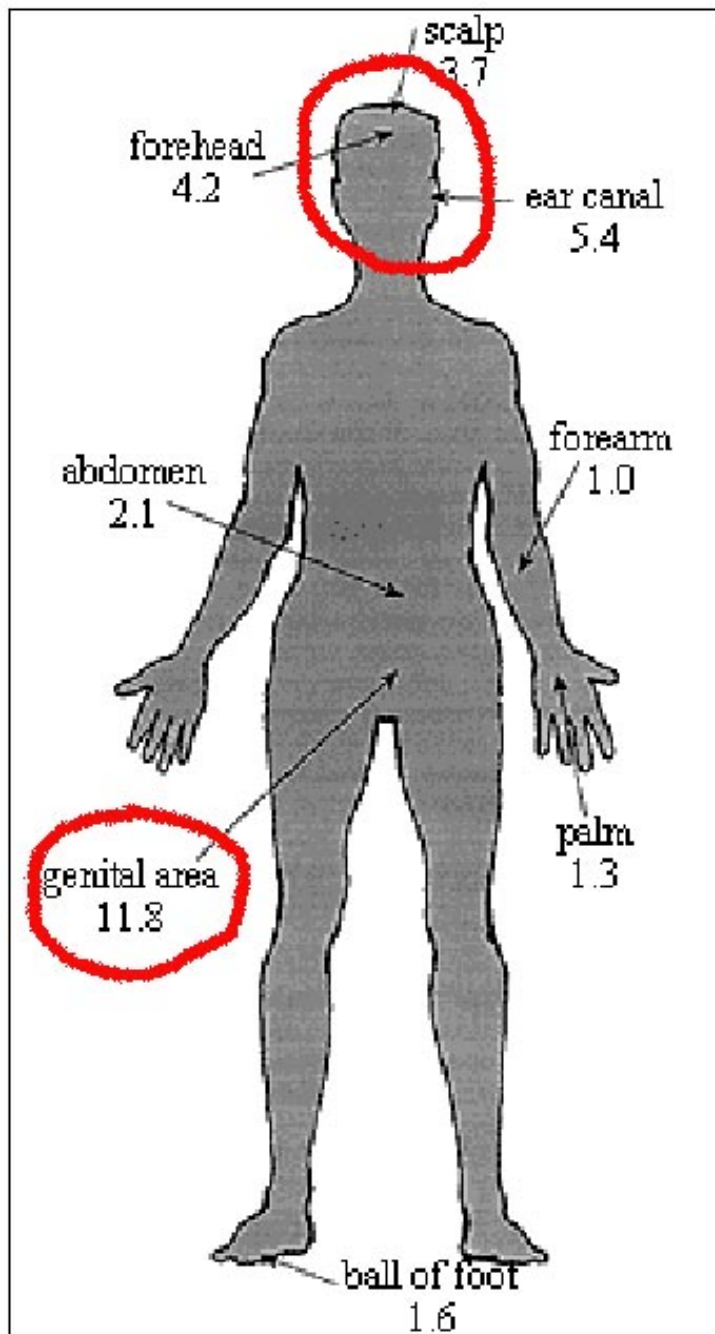


If exposed...

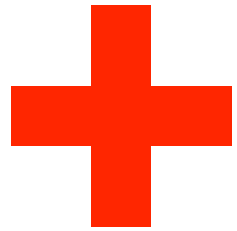
- rinse with water
- remove contaminated clothing
- wash with plenty of soap and water

Wear your PPE  
Wash your hands





- Parts of the body absorb pesticides at different rates.
- The head is 4 times more absorbent than the hand
- and the genital area is 11 times more absorbent.



# Oral Exposure

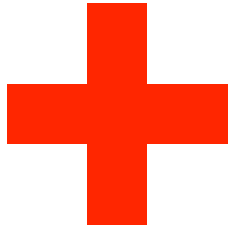
- rinse mouth with water
- Do not induce vomiting if
  - victim is unconscious
  - having convulsions
  - petroleum based product
  - corrosive pesticide
  - label specifies NOT to induce vomiting



PESTICIDE

Pesticides removed from their original containers are the highest cause of pesticide poisonings in adults and children.

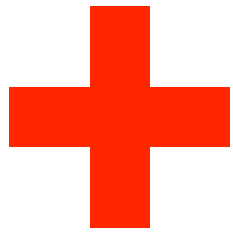




# Inhalation Exposure

- ❑ remove to fresh air
- ❑ loosen tight clothing
- ❑ keep air passages clear
- ❑ perform artificial respiration if necessary





# Eye exposure



- ❑ wash eye with a gentle stream of clean water for 15+ minutes
- ❑ get medical attention if there is pain or reddening of the eye

## LABELS SAY...

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

# Know Your Products

- **Insecticides**

- **worry**

- **Fungicides**

- **Some worry**

- **Herbicides**

- **Generally no worry**

FRAC

IRAC

HRAC

# Know Your Products

## INSECTICIDES

### OP'S

- Diazinon
- Lorsban
- Orthene
- Imidan
- Sevin

- BT products
- Confirm
- Intrepid
- Altacor
- Nematodes
- Pyrenone
- Nexter  
(Pyramite)
- Oberon

### Neonicotinoids

- Actara
- Belay
- Assail
- Admire
- Avaunt
- Spintor
- Delegate

# Know Your Products

## INSECTICIDES

- **Diazinon** 20%
- **Lorsban** 5%
- Orthene
- Imidan
- **Sevin** 10%
- BT products
- Confirm
- **Intrepid** 10%
- **Altacor**
- Nematodes
- Pyrenone
- Nexter
- **Actara** 5%
- Admire
- Assail
- Belay
- **Avaunt** 20%
- Spintor
- **Delegate** 30%

40% Organophosphates 2010 60% Greens  
60% Organophosphates 2005 40% Greens



# Know Your Products

## FUNGICIDES

### Chlorothalonils

☐ Bravo

☐ Echo

☐ Equus

☐ Chloronil

### EDBCs

☐ Mancozeb

☐ Maneb

☐ Dithane

☐ Penncozeb

☐ Manzate

### Coppers

☐ Champ

☐ Kocide

☐ Top Cop

☐ Nu-cop

☐ Abound

☐ Aliette

☐ Ferbam

☐ Indar

☐ Ridomil

# Know Your Products

## HERBICIDES

□ **Casoron**

□ **Roundup**

□ **Callisto**

□ **Devrinol**

□ **Select**

□ **Stinger**

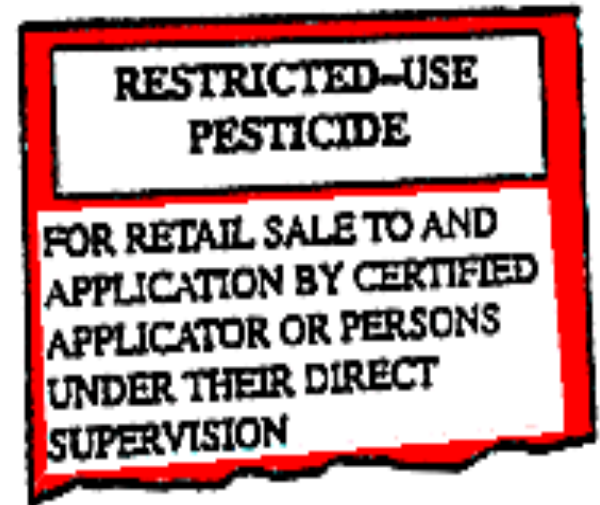
□ **Evital**

□ **Weedar 64**

□ **Quinclorac**

# Restricted Use Pesticides

- ❑ Not all restricted use pesticides are because of human toxicity.
- ❑ Know which ones are!!
- ❑ Lorsban and Diazinon



# Restricted Use Pesticides

- Actara\*

- Intrepid

- Bravo\*

- Princep\*

State restricted because  
of groundwater concerns

\* = possible or probable carcinogens

- Diazinon

Restricted because of avian  
and aquatic toxicity concerns

- Lorsban

Restricted because of  
mammalian toxicity “Warning”

- Weedar 64

Restricted because human  
toxicity concerns “Danger”  
Irreversible eye damage!

# LORSBAN and DIAZINON

When handling the concentrate...

- ❑ Coveralls over long-sleeved shirt and long pants
- ❑ Chemical resistant gloves
- ❑ Chemical resistant apron
- ❑ Chemical resistant footwear and socks.
- ❑ A NIOSH approved pesticide respirator (TC-21 C)



## All Other Pesticides still require...


- ❑ Long-sleeved shirt and pants
- ❑ Shoes and socks
- ❑ Chemical resistant gloves

# All Other Pesticides still require...

- ❑ Longsleeved shirt and pants
- ❑ Shoes and socks
- ❑ Chemical resistant gloves

But Imidan requires...

- ❑ Respirator TC-21 C



**May be fatal  
if swallowed, inhaled,  
or absorbed  
through the skin**

# All Other Pesticides still require...

- ❑ Long-sleeved shirt and pants
- ❑ Shoes and socks
- ❑ Chemical resistant gloves

But Nexter requires...

- ❑ Respirator TC-21 C
- ❑ Protective Eyewear

**May be fatal  
if inhaled**

**Causes moderate  
eye irritation**




# All Other Pesticides still require...

- ❑ Long-sleeved shirt and pants
- ❑ Shoes and socks
- ❑ Chemical resistant gloves

But Kocide requires...

- ❑ Protective Eyewear

A pink starburst graphic with a black outline, containing text about eye injury.

**Causes  
substantial but  
temporary eye injury**

# Personal Protective Equipment



## PPE

still the best way to reduce exposure  
and reduce your risk!



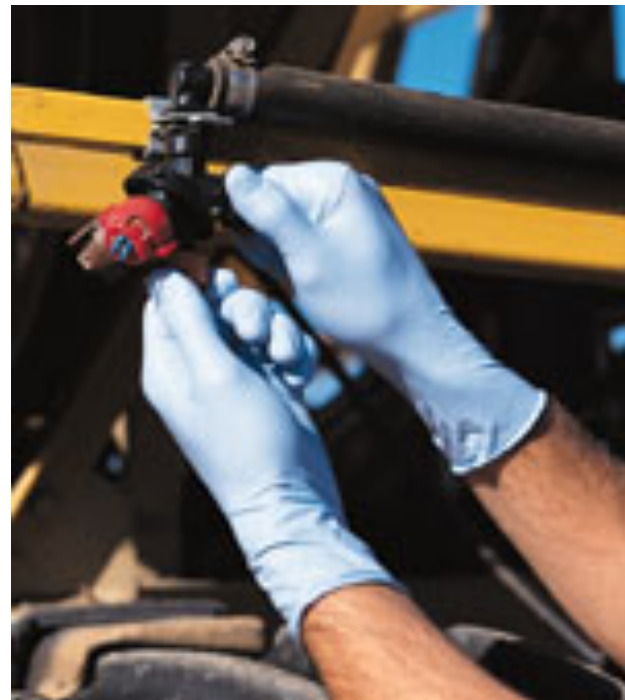
# CLOTHING/COVERALLS

- ❑ EVERY pesticide label requires long-legged pants and long-sleeved shirt.
- ❑ Coveralls always provide more protection.
- ❑ Disposable coveralls are a good idea for pesticide use
- ❑ Waterproof suit

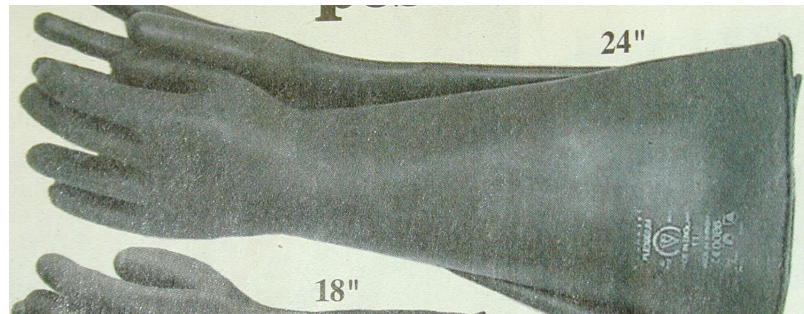
# GLOVES

## □ Chemically Resistant

- Nitrile
- Butyl
- Neoprene
- Natural Rubber
- Barrier Laminate



**Disposable Nitrile gloves**



Natural rubber



Neoprene



Barrier laminate



Nitrile

NO CLOTH  
CUFFS !!  
No linings !!

# Cranberry pesticides - which gloves?

## ■ Insecticides

### – Sevin XLR+

- Category E
- Barrier laminate
- nitrile rubber
- neoprene rubber
- Viton

- All other Sevin formulations –
  - Category A





# Cranberry pesticides - which gloves?

## ■ Insecticides

- Diazinon – Category F
  - Barrier laminate, butyl or nitrile rubber, or viton
- Lorsban 4E/Nufos 4E – Category G
  - Barrier laminate or viton
- Lorsban 75WG/Chlorpyrifos 4E-AG – Category H
  - Barrier laminate or viton



# Cranberry pesticides - which gloves?

## ■ Insecticides

- Spintor and Delegate: no gloves listed
- Assail: Waterproof Gloves (Cat. A)
- Actara, Avaunt: Waterproof Gloves (Cat. A)
- all others: waterproof (Category A implied)





# No perfect solutions

- Laminate gloves protect from all categories but can tear and are non-dextrous
- Disposables are easy to work in but not thick enough - all plastic and rubber require >14 mil
- Try thinner gloves over the laminates - get the advantage of both

# No lined gloves - but liners allowed

- All agricultural workers (harvesters, cultivators, pesticide handlers) are permitted to wear separable glove liners beneath chemical-resistant gloves.
  - Workers may choose when to wear the liners.
  - The liners may not be longer than the chemical-resistant glove so that they do not extend outside of the glove.
  - The liners must be disposed of after 8 hours of use, or at the end of the work day, whichever comes first.





# Choosing gloves for fit

- Too loose - lose dexterity
- Too tight - bind hands and may tear more easily
- Assure that pesticide can't run down into the glove
- The glove should be at least 12 inches long (half-way to elbow) but longer if reaching into containers.



# Cleaning your gloves

- Wash the gloves on your hands
- Remove carefully - don't use your teeth!!
- Wash your hands
- If you plan to use again - wash in bucket of heavy-duty detergent solution right away - the jury's out on submerging



# Inspect your gloves

- Leaky gloves are much worse than no gloves - chemical gets in and is trapped near your skin.
- Check for tears, pinholes, and signs of chemical damage - even new gloves!
- Keep a spare pair handy (seal in a zipper bag to keep clean)



# All gloves are permeable

- It's just a matter of time.
- Even barrier laminate is rated for only 4 hours of constant exposure.
- Make glove replacement a high priority.
- Replace after 5-7 days of use (10-14 if a heavy duty glove).
- Look for signs of wear but remember - it doesn't always show.

# Personal Protection Equipment

- Coveralls

- Gloves

- Boots

- Eyewear

- Respirator

- Apron

- Hat



# Personal Protective Equipment Worker Protection Regulations...

- ❑ Must be provided by employer
  - “Companies are required to make available to all workers whatever protective equipment is required for handling the chemicals they use”
- ❑ PPE should be identified
- ❑ Training should be provided
- ❑ Company should implement and enforce PPE program



# FOOTWEAR

 Shoes - ~~Leather, Canvas, Fabric~~

 Chemical Resistant Footwear or Boots:

- Chemical Resistant Shoes
- Chemical Resistant Boots
- Chemical Resistant  
Shoe Covering



# BOOTS



PVC BOOTS



VINYL  
BOOTS



# EYEWEAR

## □ Protective Eyewear

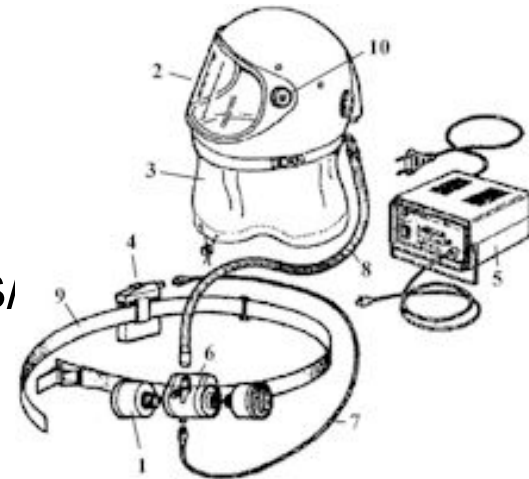
- Shielded Safety Glasses
- Face Shield
- Goggles
- Full Face style respirator



# Respirators

MUST HAVE NIOSH/MSHA APPROVAL

- Dust/mist filtering - dusts, powders, mists, and sprays. TC-21C
- Vapor removing - gases and vapors.
  - TC-23C - cartridge for organic vapors + prefilter
  - TC-14G - canister for pesticides, organic vapors



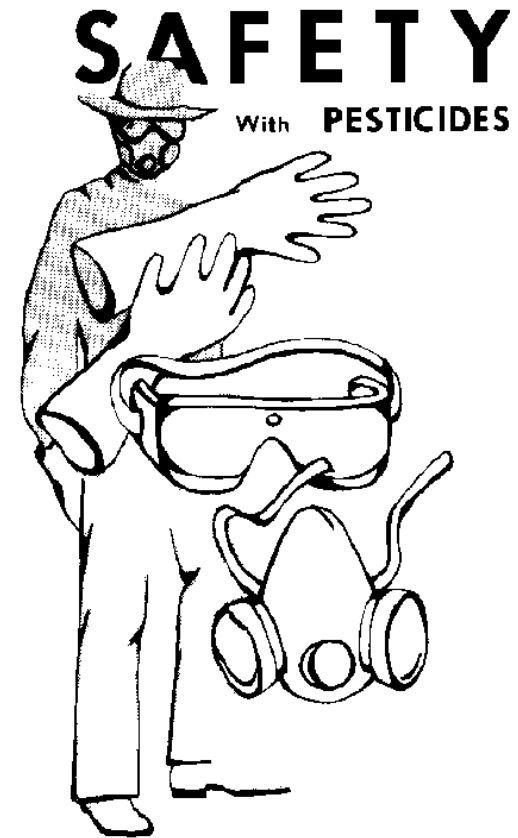
# Extra Protection

- Apron
  - Chemical resistant
- Hat or Hood
  - Chemical resistant
  - Full hood as part of respirator
  - Not ball cap used all season



# Clean Equipment!!

- Protective equipment should be cleaned *after every use.*
- Soap and water!!
- Dispose of heavily contaminated PPE



# Acute Toxicity



- immediate harm caused by pesticide exposure (within 24 hours)
- signal words measure acute toxicity for skin, mouth, lung and eye exposure

**Danger Warning Caution**

# Toxicity - 4 Categories



TOXICITY CATEGORY	ORAL LD <sub>50</sub> (mg/kg)	SIGNAL WORD	APPROX. ADULT LETHAL DOSE (ORAL)
I	0-50	DANGER/ POISON	Few drops to 1 teaspoon
II	50-500	WARNING	1 teaspoon to 1 ounce
III	500-5,000	CAUTION	1 ounce to 1 pint or pound
IV	>5,000	CAUTION	More than 1 pint or pound



# Sample Oral Toxicity Values

for Commonly-Used Cranberry Insecticides:

Pesticide (Product)	Acute Oral LD <sub>50</sub>			
	(mg/kg - male rat)			
chlorpyrifos (Lorsban)	150	382	500	776
phosmet (Imidan)		275		
diazinon (Diazinon)	350	787	1600	1960
carbaryl (Sevin)	850	699	406	699
acephate (Orthene)	945	688	1447	

Warning

Caution

# Sample Oral Toxicity Values for Commonly-Used Cranberry Insecticides:

Pesticide	(Product)	Acute Oral LD <sub>50</sub> (mg/kg - male rat)
Chlorpyrifos	(Lorsban)	150 382 500 776
Phosmet	(Imidan)	275
Diazinon	(Diazinon)	350 787 1600
Carbaryl	(Sevin)	406 699 699
Acephate	(Orthene)	688 945 1030
Imidacloprid	(Admire)	609 4690 4870
Acetamiprid	(Assail)	886
Thiamethoxam	(Actara)	1563
Pyridaben	(Nexter)	1930
Clothianidin	(Belay)	3044
Indoxacarb	(Avaunt)	1867 3619
Methoxyfenoxide	(Intrepid)	> 5000
Spinetoram	(Delegate)	> 5000
Spinosad	(SpinTor)	> 5000
Chlorantraniliprile	(Altacor)	> 5000

I  
Danger  
0-50

II  
Warning  
50-500

III  
Caution  
500-5,000

IV  
Caution  
>5,000

# What this means

higher  $LD_{50}/LC_{50}$  = less toxic



lower  $LD_{50}/LC_{50}$  = more toxic



# Chronic Toxicity

- ❑ delayed - time lapse between exposure and effects (don't appear immediately)
- ❑ result of repeated exposure to same pesticide or one with similar mode of action
- ❑ or from a single exposure
- ❑ effects are not seen until much later

# Chronic toxicity can cause

- ❑ cancer
- ❑ tumors
- ❑ birth defects
- ❑ infertility or sterility
- ❑ impotence
- ❑ blood disorders (anemia, inability to clot)
- ❑ brain damage
- ❑ paralysis
- ❑ emphysema, asthma
- ❑ kidney problems



## REMEMBER:

Low-level exposure to chemicals that have potential to cause long-term effects may not cause immediate injury, but repeated exposures can greatly increase the risk of chronic adverse effects.



# Carcinogens



***Group B =***

***Probable Human Carcinogen***


***Group C =***

***Possible Human Carcinogen***



# Probable Human Carcinogen

## B2 Carcinogens

- Bravo - chlorothalonil
  - Maneb
  - Mancozeb
  - Vapam
  - Omite
  - Kerb - pronamide
  - DDT
- 

## Possible Human Carcinogen

## C Carcinogens

- Actara – thiamethoxam
- Evital – norflurazon
- Orthene – acephate
- Casoron – dichlobenil
- Sevin – carbaryl
- Princep – simazine
- Indar – fenbuconazole



**HAZARD = EXPOSURE x TOXICITY  
(or RISK)**

The best way to avoid a pesticide poisoning is to protect yourself by reading the label and wearing personal protective equipment.

